

Request for Research Funding for FY 2023-2024

Project Number (Research Center Use Only): GEO-24-01

Requesting Office	Geotechnical and Districts 1 & 7	Priority	1 of 3
Proposed Title	Resiliency of MSE Wall Subjected to Surge and Wave Loading		
Justification	Describe the current situation, why the research is needed, and how the research affects your office’s mission critical focus areas: MSE walls along the coast have failed during recent hurricane events, leaving bridges to barrier island inaccessible. These walls were constructed to Specifications that have since been revised. To evaluate extreme event resiliency, the performance of representative MSE wall models subjected to storm surge and wave loading need to be studied to identify the modes of failure and update recommended design methods, materials used for construction, or both.		
Impact	How shall the results impact practice?: The results will identify if higher porosity backfill should be used and if alternative high porosity features should be added to the external facia of walls to reduce forces from surge and wave loading. Consequences of not doing the research?:Consequences include the potential for issues with MSE walls, even when the current Specifications are implemented, and uncertainty of wall reliability in extreme weather events.		
Affected Offices	Identify any office and names of office personnel that will need to be involved in the scoping or conduct of the research, will be affected by implementation of the results, or will need to participate in the implementation process—including OTIT, if enterprise data/network software application will be a deliverable, and district staff, as appropriate, e.g., through statewide meetings. If the requesting office will not be the implementing office, please identify which office and names of specific personnel which will have to serve in that capacity—have they been involved? Geotechnical, Structures Design, Materials, Construction (all offices are involved in scoping and review.) The District Geotechnical Materials Engineer for Districts 1 & 7 will also be involved in scoping & review.		
Existing Work	Learning About and Using the Research in Progress (RiP) Database http://www.trb.org/main/blurbs/176215.aspx As a minimum, the Transportation Research International Documentation (TRID) and the Research in Progress (RIP) online databases should be reviewed by an expert in the research subject matter to assure research effort and resources shall not duplicate prior or ongoing work. TRID: https://trid.trb.org/Results RIP: https://rip.trb.org/ A search of the TRID and RIP databases did not show a research effort that duplicates the proposed research. There is an active project by the Wisconsin DOT “Mechanically stabilized earth (MSE) wall backfill water infiltration” that is intended to study water infiltration into a MSE wall in a non-dynamic loading fashion and identify the line between the saturated and partially saturated backfill and prediction of internal and external stability. A phase of the proposed research will consider the saturated MSE wall backfill under dynamic loading and the findings of the Wisconsin DOT work may be informative in the development of the experimental phase.		
Keywords Used In Existing Work Search (Cannot leave blank)	MSE wall, Resilient infrastructure, surge and wave loading		
Related Contracts (Give contract numbers)			
Funding Request	\$395,000	Anticipated Duration	2 yrs
Project Manager	Proposed technical manager to oversee research Larry Jones	Contracting Method	Anticipated procurement method (e.g., supplement to existing project, RFP to all registered vendors, direct contract with university) Direct contract with university – Scott Wasman (FSU) & Michael McVay (UF)

Equipment	Estimated equipment cost (or N/A):	Comments* (understanding leases are preferred, include the proposed use of the equipment, whether lease options are feasible, whether work to be done with equipment could instead be procured through service expenditure, etc.) The UF centrifuge and existing centrifuge instrumentation will be used to the greatest extent possible. A centrifuge “bucket” will need to be designed and built to satisfy the needs of the project. The bucket will need to be watertight, and include a water reservoir, pumps, a wave generation system and underwater gauges.
Urgency	Score 1-5 1= highest, most immediate need 1-2	Comments* (elaborate as appropriate on justification/impact comments to explain the urgency of the need . . . is a solution needed immediately, needed within a certain period of time or by a known or anticipated deadline, desired for enhancement, etc.): The tropical storm season lasts about 6 months with potential significant disruption to Florida communities, including damage to transportation infrastructure. Having an understanding of the engineering required to reduce the likelihood or severity of damage to MSE walls within the earliest timeframe is needed.
Implementability	Score 1-5 1=greatest likelihood of and proximity to implementing results: 1	Comments* (consider both the likelihood of implementation and the length of time and resources required to implement the results of the research.) Identify any prerequisites to, requirements for, or barriers to implementing the anticipated results of this research (e.g., new or change to existing specifications, development of production units of prototype device, legislative change); please indicate if multiple phases of work shall be required: Solutions based on the proposed research findings and recommendations have a very high likelihood of implementation as it is anticipated that solutions will include using existing materials and alternative design methods. The implementation should include changes to FDOT design specifications (e.g., Structures Design Guidelines) published annually and Construction Specification 548.

Project Benefits (Succinct, complete explanation)

The project will enhance the understanding of a reinforced soil structure’s response to hydrodynamic (storm surge and wave) loading, which has a higher likelihood of exposure along Florida’s coastline and where failures during tropical storms have been observed. The State will benefit through revisions to the engineering design standard specifications that will increase the reliability, enhance the cost benefit as the repair costs to design/construction/material costs will decrease, and improved emergency management following post storm impact.

Project Benefits (Select all that apply and explain)	Quantifiable Benefits (units, dollars, etc...if applicable)	Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits
<input type="checkbox"/> Materials Enhancement		
<input type="checkbox"/> Materials Savings	Potential Cost Savings	Resiliently designed embankments would remain in service and not require reconstruction after storm events recently considered extreme.
<input type="checkbox"/> Time Savings	Months	Resilient designs lead to less repair and re-construction time
<input type="checkbox"/> Lives Saved/Injuries Prevented	Potentially	Access to barrier islands because of reliable MSE walls that allow causeways and bridge to stay in-service. These corridors are frequently critical for evacuation and emergency response services.
<input type="checkbox"/> Other (Explain) Repair costs	\$\$	Costs associated with immediate and temporary abutments and new MSE walls

*Comments should explain and support urgency, financial benefit, and implementability scores